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CURRENT MANGANESE OPERATIONS IN VIRGINIA

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Introduction

Manganese production in Virginia, after a lapse of several years, has recently increased, and now annual production nearly equals that of the peak years in the past.

Manganese ranks thirteenth in abundance among the elements in the earth's crust. Although it occurs in over 100 minerals, only a few are important sources. These include the oxides pyrolusite, psilomelane, manganite, and braunite; the carbonate rhodochrosite; and the silicate rhodonite. In Virginia the oxides are the important sources.

The main use of manganese is in the manufacture of steel. There is no substitute for manganese in deoxidizing, desulphurizing, and recarbonizing steel. Also, when the manganese content is increased from less than 1 per cent, the normal amount found in steel, to between 11 and 14 per cent, the steel becomes exceedingly tough and resistant to abrasion. Such steel is known as manganese steel and is used extensively in the electrical industry and where resistance to shock and abrasion is important, as in rails and rock-crushing machinery. In steel rails, manganese increases the life of ordinary carbon steel 5 to 6 times.

Other uses for manganese are in dry batteries, in the manufacture of certain types of brick and glass, in fertilizers, and in manganese sulphate, which is used in agriculture.

History of Manganese Production in Virginia

Production of manganese is reported to have begun in Virginia in 1832, although apparently little was produced before 1867. From 1867 through 1946, manganese was mined annually, and up to 1916 Virginia had produced 55 per cent of the total manganese mined in the United States. (See Table 1.) However, since 1917 most of the production has been coming from the western United States. Production from mines in Virginia ceased in 1946, although concentrates from the dumps at Crimora and Old Dominion mines in Augusta County were shipped for several years thereafter. In 1950, 50 long tons were mined and shipped from the Glade Mountain mine in Smyth County. No production was reported in 1951, but since 1952, when 903 long tons were mined, production has been increasing.

For the period from 1867 through 1948, Virginia produced 377,905 long tons of high-grade manganese ore (35 per cent or more manganese content). Of this total, 199,412 long tons were produced during three short periods: 1885 to 1891, 120,356; 1916 to 1919, 31,633; and 1941 to 1945, 47,423. During the period 1867 through 1950, Virginia also produced 163,628 long tons of manganiferous ore (less than 35 per cent manganese content).

Producing Districts

Manganese has been produced in three districts in Virginia: the Ridge and Valley district, the Blue Ridge district, and the Piedmont district (Figure 1).

In the Ridge and Valley district, manganese occurs in the Valley Ridges section from Frederick County southwestward to Lee and Scott counties, and in the Massanutten Mountain section of Shenandoah County. Most of the past production in this district has come from Frederick, Shenandoah, Giles, Bland, and Tazewell counties.

Manganese is found along the west foot of the Blue Ridge from Front Royal southwestward to the Tennessee state line in the Blue Ridge district. The chief producing counties have been Warren, Page, Augusta, Rockingham, Rockbridge, Wythe, and Smyth. About 42 per cent of the total past production of Virginia has come from the Crimora mine in Augusta County.

Most of the past manganese production of the Piedmont district has come from Campbell and Appomattox counties. However, manganese also occurs in the Piedmont counties of Spotsylvania, Louisa, Fluvanna, Buckingham, Albemarle, Nelson, Amherst, and Pittsylvania.

Although manganese has been mined in about 25 counties in Virginia, most of the production has come from five counties: Augusta, Smyth, Frederick, Bland, and Wythe.

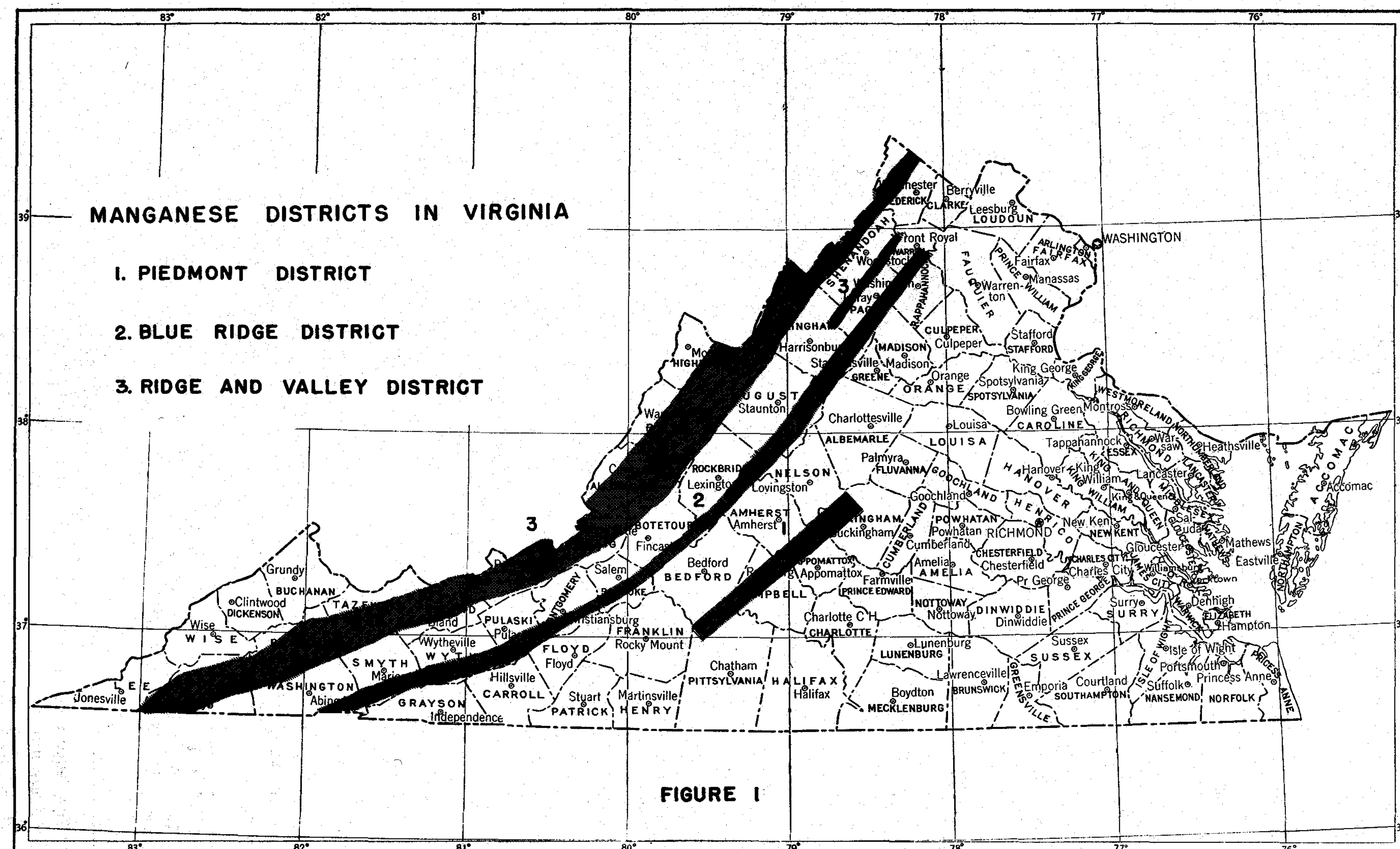
MANGANESE DISTRICTS IN VIRGINIA
1. PIEDMONT DISTRICT
2. BLUE RIDGE DISTRICT
3. RIDGE AND VALLEY DISTRICT
1
2
3
3
83°
82°
81°
80°
79°
78°
77°
76°
39°
38°
37°
36°
WASHINGTON
LOUDOUN
Leesburg
Berryville
CLARKE
Front Royal
FAUQUIER
Fairfax
Manassas
PRINCE WILLIAM
Warren-ton
Stafford
STAFFORD
CULPEPER
Culpeper
MADISON
Madison
Orange
ORANGE
Spotsylvania
SPOTSYLVANIA
King George
Bowling Green
CAROLINE
Montross
WESTMORELAND
Tappahannock
ESSEX
Heathsville
Accomac
ACCOMAC
Harrisonburg
Staunton
Charlottesville
ALBEMARLE
Louisa
LOUISA
Palmyra
FLUVANNA
Goochland
HANOVER
Hanover
King William
Lancaster
ROCKBRIDGE
Lexington
NELSON
Lovingston
AMHERST
Amherst
POWHATAN
Powhatan
RICHMOND
Cumberland
CUMBERLAND
New Kent
NEW KENT
Gloucester
Mathews
Eastville
NORTHAMPTON
BOTETOURT
Fincastle
Salem
Bedford
BEDFORD
Appomattox
Farmville
PRINCE EDWARD
Amelia
AMELIA
CHESTERFIELD
Chesterfield
Pr George
PRINCE GEORGE
Charles City
CHARLES CITY
Surry
SURRY
Dendigh
Hampton
Grundy
BUCHANAN
Clintwood
DICKENSON
Wise
WISE
PULASKI
FRANKLIN
Rocky Mount
Charlotte C H
CHARLOTTE
NOTTOWAY
Nottoway
DINWIDDIE
Dinwiddie
Sussex
SUSSEX
Isle of Wight
ISLE OF WIGHT
Portsmouth
Princess Anne
PRINCESS ANNE
Jonesville
SMYTH
Wytheville
WASHINGTON
Hillsville
CARROLL
FLOYD
Floyd
Chatham
PITTSYLVANIA
HALIFAX
Halifax
Lunenburg
LUNENBURG
Lawrenceville
BRUNSWICK
Emporia
GREENSVILLE
Courtland
SOUTHAMPTON
Suffolk
NANSEMOND
NORFOLK
GRAYSON
Independence
Stuart
PATRICK
Martinsville
HENRY
Boydton
MECKLENBURG

FIGURE I

TABLE 1

Percentage of the total annual production of manganese ore (35% or more manganese content) in the United States, produced in Virginia from 1867 through 1946.*

Year	Percent	Year	Percent	Year	Percent	Year	Percent
1867-79	76.6	1896	20.0	1913	100.0	1930	5.45
1880	63.5	1897	32.8	1914	65.4	1931	3.83
1881	67.3	1898	35.4	1915	16.9	1932	2.95
1882	65.8	1899	62.6	1916	14.8	1933	20.20
1883	87.0	1900	66.9	1917	10.1	1934	6.02
1884	88.2	1901	35.6	1918	3.73	1935	9.28
1885	80.6	1902	40.6	1919	7.83	1936	4.20
1886	68.1	1903	60.3	1920	2.63	1937	5.60
1887	57.4	1904	97.0	1921	6.40	1938	8.95
1888	60.4	1905	95.6	1922	5.91	1939	5.66
1889	60.3	1906	87.1	1923	3.45	1940	5.52
1890	49.4	1907	82.1	1924	2.75	1941	6.95
1891	69.3	1908	100.0	1925	3.75	1942	6.38
1892	44.7	1909	100.0	1926	8.20	1943	3.08
1893	53.0	1910	100.0	1927	7.22	1944	8.73
1894	28.4	1911	99.5	1928	7.80	1945	5.03
1895	17.9	1912	92.2	1929	5.05	1946	0.74

* Source of information--Unpublished report on manganese in files of Virginia Division of Geology.

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Government Stockpiling Program

The revival of manganese production in Virginia in 1952 is related to the fact that the United States consumes approximately 30 per cent of the world's annual production of manganese yet produces less than 4 per cent of the annual production. So, when the Korean conflict began in 1950, with the resulting possibility of another world war, in which case the foreign supply of manganese and other critical materials would be endangered, Congress amended the Defense Production Act. Under this amendment, the government allocated funds for the establishment of a minerals exploration program to be carried on under the Defense Minerals Exploration Administration. (Now the program is under General Services Administration and Office of Defense Mobilization.) The funds are used to subsidize the cost of exploration for certain strategic materials, one of which is manganese. Anyone interested in obtaining this aid must make application to the Office of Defense Mobilization (formerly DMEA), accompanied by evidence that the geology of the area is favorable for the occurrence of manganese. If the Office of Defense Mobilization is assured of the feasibility of the project, it will pay 75 per cent of the cost of exploration. If the exploration is successful and the property is put into operation within 10 years, the government is repaid on a royalty basis. If the project is unsuccessful, the government does not have to be repaid.

At the time of inauguration of the DMEA, the government also began a stockpiling program for domestic manganese. Under this program the government contracts to buy at guaranteed prices specified amounts of manganese ore meeting certain chemical and physical requirements.

The chemical requirements are that the ore must contain at least 40 per cent manganese, not more than 16 per cent iron, not more than 15 per cent silica plus alumina, and not more than 0.3 per cent phosphorus. The combined copper, lead, and zinc content may not exceed 1 per cent, and of this 1 per cent the copper content may not exceed 0.25 per cent.

For physical requirements the ore is classified under three types: Type 1 - lump ore that must be natural ore, unprocessed except for grading, washing, or screening and not more than 5 per cent shall pass a Tyler standard 20-mesh screen; Type 2 - natural ore, unprocessed except for grading, washing, and screening and not more than 15 per cent shall pass a Tyler standard 20-mesh screen; Type 3 - natural fines or concentrates densely agglomerated by the application of heat and not more than 5 per cent shall pass a Tyler standard 20-mesh screen.

The base price paid for manganese ore under the program is $2.30 per long ton dry unit or $110.40 per long ton for ore that contains 48 per cent manganese, 6 per cent iron, 11 per cent silica plus alumina, and 0.12 per cent phosphorus. For ore that is superior to the above the shipper is paid a premium, and for ore that is inferior the shipper is penalized.

Present Production

Stimulated by the stockpiling program, mines were reopened in Virginia in 1952, when 903 long tons were produced. Production increased to 7548 long tons in 1953 and 20,240 long tons in 1954. During the first 6 months of 1955, 10,880 long tons have been produced, as compared with 6133 long tons for the similar period of 1954 (Table 2). The Virginia production represented 70 per cent of the total offered under the high-grade manganese stockpiling program in 1953 and 52 per cent of the total in 1954.

The greatest percentage of the recent production and most of the activity today is in the Blue Ridge district, where manganese is associated with the Erwin quartzite, Shady dolomite, and the Rome formation. During July 1955 the two largest operations

TABLE II

MANGANESE PRODUCTION IN VIRGINIA-January 1, 1954 through June 30, 1955*

1954	Long Natural Tons 35% Mn	Average % Mn
January	482	41.19
February	589	45.75
March	1,030	45.89
April	1,619	45.16
May	1,200	43.31
June	1,213	42.48
July	558	39.85
August	2,767	42.57
September	1,990	42.99
October	3,191	43.39
November	2,897	43.33
December	2,704	43.07
Total--1954	20,240	43.24
1955		
January	1,811	42.73
February	1,065	42.73
March	1,253	43.38
April	981	44.09
May	2,645	42.96
June	3,125	42.83
Total--1955	10,880	43.12

* U. S. Bureau of Mines figures.

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TABLE III

Manganese Shipments by Districts for First Six Months of 1955*

	Blue Ridge District	Valley and Ridge District	Piedmont District
January	1272	539	None
February	748	317	None
March	309	470	474
April	398	329	254
May	2169	393	83
June	2765	360	None
Total	7661	2408	811

Total for all districts -- 10,880

* U. S. Bureau of Mines figures.

in the State were located in Smyth County, where mines are operating on Glade Mountain, Brushy Mountain, and Iron Mountain. Mines have recently operated south of Sugar Grove, Smyth County, but were closed as of July 1. To the northeast, between Buena Vista, Rockbridge County, and Elkton, Rockingham County, there is considerable activity today, although very little ore has been produced yet. Exploratory work has been done and a plant installed in the Buena Vista area, but no ore had been shipped as of July 1. A plant has also been installed near Midvale, Rockbridge County; exploratory work has been done, and the company is ready to start production. Near Vesuvius, Rockbridge County, exploratory work has been done, and the company expects to install a plant in the near future. The Crimora and Old Dominion mines in Augusta County are again in operation, and some ore has been shipped.

In the Ridges and Valley province, where manganese is associated with the Oriskany sandstone or the rocks immediately underlying the Oriskany, present activities are confined to the southwestern part of the State. Three mines are in operation in this district, two on Flat Top Mountain, near the Giles-Bland County line, and one near Newport, Giles County. Mines have recently operated on Round Mountain, Bland County, and on Mineral Ridge, Frederick County.

Recent production in the Piedmont district has been confined to Appomattox and Campbell counties, where manganese is associated with quartzite and marble of the Mount Athos formation. At present, mines are operating near Beckham, Appomattox County, and Rustburg, Campbell County. Exploratory work is being done near Oxford Furnace, Campbell County, and Evington, Campbell County. A plant has been installed and some ore shipped from the mine near Oxford Furnace.

As shown by Table 3, the greatest part of the production for the first six months of 1955 came from the Blue Ridge district. Within this district, Smyth County leads in production. For the same period, the Ridge and Valley district ranks second and the Piedmont district third. This seems to have been the case since manganese production began in Virginia, with the Blue Ridge district being the leading producer, the Ridge and Valley district second, and the Piedmont district third.

The present stockpiling program will end on June 30, 1958, unless it is extended by Congress. As long as the present prices for manganese are paid by the government, the interest in Virginia deposits will remain high, and the current production should stay up. However, once the stockpiling program ends, production will probably decline. For Virginia manganese operators to compete with foreign markets, they will have to sell their ore for approximately half of the present government support prices.

Anyone interested in detailed technical information on manganese in Virginia is referred to the references listed below.

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